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SILVER

MINING REGIONS

OF

COLORADO.

WITH SOME ACCOUNT OF THE DIFFERENT PROCESSES NOW BEING INTRODUCED FOR WORKING THE GOLD ORES OF THAT TERRITORY.

BY J. D. WHITNEY, OF BOSTON.

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PREFACE.

The pages contained in this pamphlet have been hastily written and compiled, and are not given as the result of that care and research, due to the vast and unrivalled mineral resources of Colorado, but for the primary purpose of attracting the attention of Capitalists to the inviting Silver fields of the Cordillera Ranges, whose merits are destined at an early day to be the subject of more extended and critical observation.

J. P. WHITNEY.

Boston, December, 1865.

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SILVER MINING

IN COLORADO.

If we would search for precious metals, we should give our exertion in prospecting where the indications of Nature most directly point. She has lavishly distributed her gifts, and a search for them should be directed by intelligent inquiry, and not by hap-hazard or reckless effort.

The theory of formation, or origin of metalliferous deposits, is one admitting of more attention and study than has yet been bestowed upon it, but geological research has furnished us with general principles by which both the origin and natural place of deposit may be determined.

We find gold and silver, more or less, in all the pyritous and galena ores of the United States, particularly in iron and copper ores, though often in such small quantities as to be of less amount than the expense of extraction.

These ores belong to an earlier state of creation than coal, and it would be useless to look in the immediate vicinity of coal beds for any quantity of gold or silver. Neither is the limestone formation in chemical affinity to these metals.

Their natural neighborhood is that of quartz, which has an igneous or volcanic origin. Here we find the association of the sulphurets of gold and silver with those of iron, lead, tin, copper, antimony and arsenic. Emitted in a volatile state from a depth below with sulphurous vapors, they were freed by chemical action with oxygen and acids from the alkalies which held them in solution, and disseminated through the adjoining granite. The value of a vein depends much upon its nature, whether it be a rent upon the earth's surface filled with ore, or if it be produced directly from an injection, by expansive force below. If its formation is igneous, it is most valuable, as its dimensions and richness increase with its depth.

We have the authorities of the most eminent geologists and metallurgists for the assertion, that the Rocky Mountains are the legitimate localities for true gold and silver bearing ores.

Their situation and geological characteristics prove the early date of their existence, dating far beyond the deposits of the plains below. They present indisputable proof of their volcanic origin. Vast and immense upheavals, they exhibit the true plutonic ores, the granite, the silex, the sulphurets of iron, copper, lead, antimony, tin, bismuth, and all the attendants of precious metals in their primitive state, and in such profusion, such inexhaustible quantity as to almost challenge our belief.

All main lodes here are vomited forth from the mysterious depths of the earth, by the convulsions below, and the seams or lines of surface can be followed with a precision and certainty that is remarkable.

The silver fields now discovered and opened in Colorado, upon the western slope of the range, but a short distance from the gold belt of veins, are apparently in prominence and value, beyond any known in the world, and the results that will be realized there within the next few years, will constitute an epoch in the history of silver mining. Were it generally known to day how rich and inviting the silver fields of Colorado are, we should witness an attention and investment there more conspicuous than any exhibited before dur-

ing the present age. An excitement of magnitude is inevitable and will come.

The wealth of the mines of Mexico is historic. We are informed by Humboldt in his *Essai Politique*, that "The yield of the Mexican mines since the conquest to 1803 had been $2,027,952,000, all of which was produced from a few central spots, and the mining confined to a comparatively limited circle." The registered coinage of the Mint of Mexico from the year 1733 to 1860 shows $1,741,573,107.

When we remember that the royalty to the King of Spain, to whom until the commencement of the nineteenth century the Mexican States paid tribute, was one-fifth, or 20 per cent of yield; and take into consideration the royal monopoly of quicksilver and gunpowder, the result seems astonishing. The Mexican method of mining was crude and simple. The ore, as well as the water from the bottom of the shafts, was generally brought to the surface upon the shoulders of *tenateros* (carriers) over ladders.

Their *Arrastres* or crushing mills and amalgamators were of the rudest possible character, and were run almost wholly by mule power.

The following registered yields of a few Mexican mines may be interesting to the reader: —

Biscaina vein . . .	$16,341,600.
Santa Anita vein, . .	$21,347,210.
Valencia vein, . . .	$31,813,486.
Rayas vein, . . .	$85,421,014.
Veta Madre vein, . .	$225,935,736.

The Pavellon vein when first opened, was said to have produced $20,000 per day for five years, when a torrent of water from the mountains filled its shafts, and swept away the improvements. It was opened again, and for the succeeding ten years yielded $60,000,000, when it was again abandoned in 1696 and not opened again until 1787, when it was vigorously worked for eight months. The ore taken from it in that period yielded $11,500,000.

The different members of the noted *Fagoaga* family are estimated to have received during fifty years working of two veins, over $16,000,000 in profits.

That the great mineral treasures of Mexico commence at the point where Humboldt rightly states the labors of the miners to have terminated, is conceded by those familiar with the country north and south, and the natives themselves. We may be surprised when considering this fact, that such localities, known to be so

much richer than the interior sections, should have been so long neglected.

But the true cause is apparent when reviewing the condition of affairs in Mexico. The mint of Mexico until recently was a monopoly, which made it very difficult in the parts of the country distant from the mint to obtain a circulating medium. Dollars became an article of trade, the price of which depended upon the supply; individuals mining upon their own account, any distance from the Capital, were compelled to part with their bars of silver for coin, at from 25 to 30 per cent discount; and in the extreme northern provinces native silver was often exchanged for half its real value for coin. It is difficult for us in this country to understand how such a state of affairs could have long existed; but that they did, is a matter of record. The extreme northern mines of Durango and Chihuahua have been proven as vastly richer than those of the interior. It is upon the records of Mexico that one Senor Zambrano, proprietor of two mines at San Dimas, Durango, paid as the King's fifth upon the silver raised from the two mines, from 1783 to 1807, the sum of Eleven Millions of Dollars. Nothing but the extreme richness of the ore could have paid the royalty

of the King, and the heavy duties entailed by the distance of those mines from the Capital.

Those mines were abandoned but a few years ago, the methods of mining being so expensive in a country distracted by civil war. At the time of abandonment, the water from the bottom of the deepest shaft, 900 feet, was brought to the surface in leathern buckets, upon men's shoulders. What could be accomplished by modern appliances of machinery, under a healthy and liberal government, is yet to be determined.

The Carmen vein, north of Durango, in the State of Chihuahua, among the mines of Batopilas, upon the western declivity of the Sierra Madre, has produced enormous yields of silver. From this vein three masses of pure malleable silver were taken, weighing collectively 870 lbs.

The mines of Santa Eulalia in Chihuahua are the most northern of any mines in the Mexican States which have been worked with any regularity, and proved by the richness of their ores the superiority of the northern mines of Mexico over those of the interior and southern part. The registered yield of the mines of Santa Eulalia from 1705 to 1737 was $55,959,750, or an average of $1,748,742 per annum; from 1737

to 1791 the yield exceeded $44,000,000, making a total for eighty-six years of $100,000,000.

This extreme northern district was abandoned in the year 1800 from its proximity to hostile indian tribes, whose savage incursions could not be prevented by the mining population, who received no assistance from the Mexican Government, which was itself engaged in civil discord; and the flourishing Haciendas for reducing metals, which were once in such a flourishing condition, are now a mass of ruins.

Thus the tantalizing wealth of the northern mines of Mexico and the rich tracts of Arizona and Colorado have remained undeveloped until the present day.

The report of Mr. Glennie a very enterprising and intelligent English traveller, who made, in the years 1824 and 1825, a number of excursions over the northern Sierra Madre range, confirms the good reputation these unsettled tracts have had in the estimation of those familiar with the northern mines of Mexico.

A single instance of the result of an exploring expedition by some Mexican *Buscones*, (searchers) into the regions of Arizona, (contiguous to Colorado) in the commencement of the eighteenth century, will illustrate the wealth

of that region. Upon their return they brought most wonderful accounts of richness, and in proof, 4,033 lbs. of pure silver, one mass of which, alone, weighed 108 arrobas, or 2,700 lbs. — the largest mass of pure silver ever found in the world. The fact is well substantiated by record. The claims of royalty to the King being disputed by the explorers, which led to a long and vexatious suit, resulting in a royal decree of Philip the Fifth, dated Aranjuez, 28th May, 1741, which terminated a prosecution by the Royal Fiscal against the discoverers of Arizona, and gives the weights of the balls, sheets, and other pieces of silver discovered (*bolas, planchas, y otras piezas de plata*).

The decree ends by declaring Arizona to be Royal property as a "*Criadera de Plata*" (a place by which, by some natural process silver was created).

In consequence, an end to enterprise in that region occurred and it has remained until this day, comparatively unknown and infested by hostile indians.

An attempt to found a colony there to work the mines upon Royal account, was made, which owing to want of support failed.

The following extract from the report to the

English Government by H. G. Ward, Chargé d' Affairs to Mexico for a number of years, may not be uninteresting in view of the developments of the silver regions of Colorado.

The report was published in the year 1827 for the benefit of English capitalists who had invested largely in Mexican Mines, and was the result of a long and critical examination of the mineral resources of the country.

"The hitherto unexplored regions in the north of Mexico contain mineral resources, which, as discoverers proceed, are likely to make the future produce of the country infinitely exceed the amount that has been hitherto drawn from the (comparatively) poorer districts of the South." * * * The specimens which I have seen of the ores extracted from about 36° north latitude almost induce one to adopt the theory that the proportion of silver contained in the ores increases as you advance North, a theory which is generally believed at present, in Mexico, and which is certainly confirmed by the superiority of all the Northern ores, to those of the richest districts in the South."

The line of Mexico at that time extended along the Arkansas River to the 42d parallel which included the regions of New Mexico

Arizona and Colorado; the line of Colorado commencing at 31° and ending with 41° north.

The writer saw in Colorado, the past summer, in the possession of a soldier who had just returned with a military detachment which had been engaged in making a military road in the mountainous country of the new Territory of Wyoming, north of Colorado, several pure silver nuggets weighing in the aggregate over two pounds which the soldier claimed to have separated with a knife from a crevice between some rocks, in that country. This evidence, with the reports of many others, would induce the belief that the rich mines of silver exist in the continuation of the Sierra Madre range, far into the snowy regions of the British Possessions, and seems conclusive to those who have given consideration to the subject.

Their towering heights, sundering the waters of the continent, are the same mighty upheavals from the sulphurous depths of the globe.

We find a belt of pyritous gold veins in Colorado, surpassing in richness any known in the world, to which the gold fields of California bear no comparison.

As in the instance of the Sierra Nevada range of mountains upon the Pacific coast, which are

found gold producing upon the western slope, and abounding in silver veins upon the eastern, so in a richer degree are found the Sierra Madre, or Mother Mountains in Colorado, with the exception that the order is reversed, the gold veins being found upon the eastern slopes, and the argentiferous veins upon the western, bearing towards the less prominent, but rich outcroppings of Rush Valley, Reese River and Washoe.

The richest silver mines of the world are those of high elevation.

It has been the experience in Mexico, and it is a well known fact, that the mines of Great Potosi, which have produced over one thousand millions, are worked at a height exceeding that of Mont Blanc. Those of Colorado are at an elevation of from 8000 to 10,000 feet above the level of the sea, yet in the vicinity of most fertile parks, and unfailing streams.

These mines are situated directly over the range, scarcely twenty miles from the Gold Belt, and adjacent to the route of the Denver and Salt Lake road, by way of Berthoud's Pass, which Pass must be the one of the Pacific Railroad, unless it passes far to the northward, far away from the mining districts, over the old stage route, which is about 2000 feet higher than

that of Berthoud's. But it is extremely improbable that the northern route will be adopted; in fact it has now been decided to run the daily line of stages for Salt Lake over Berthoud's Pass by way of Empire City, and the amount of freight that will pass over that road the succeeding year will be enormous.

Few have any idea of the immense amount of freight which left the Missouri River during the summer of 1865 for Colorado and the territories beyond. Over one thousand teams averaging 5000 lbs. of freight each have passed a given point on the route in one day. 20),000,000 lbs. have been estimated by competent parties to have been the amount of freight carried over the plains this summer.

It may be conjectured what shall be the demand for an ensuing year, of a people who multiply so rapidly as one who have rich mineral districts to develop.

The Silver veins of Colorado have been examined by those familiar with those of the richest districts in Mexico, who agree that those particularly of Ten Mile District are fully equal to any they have ever seen; in fact, superior in their surface indications, having within a few feet of the surface distinct veins, in some instances, to a

width of from three to five feet, of the purest argentiferous galena ore. They have been sunk upon sufficient to develop their solid and massive proportions, and appear practically inexhaustible.

The following presents the results of assays of ores taken at random from veins in Ten Mile District:

STATE ASSAYER'S OFFICE, 20 STATE ST.,
BOSTON, September 25, 1865.

Samples of argentiferous galena ores received have been assayed with following results:

SIBERIAN LODE. One ton of this ore contains 106 oz. 9pwts. 20grs. of pure silver, or $138,44 (coin.)

HARD CASH LODE. One ton of this ore contains 108 ozs. 2 pwts. 12 grs. of pure silver, or $140.57 (coin).

PYRAMID LODE. One ton of this ore contains 81 ozs. 13 pwts. 8 grs. of pure silver, or $106.17 (coin).

AUGUSTINE LODE. One ton of this ore contains 221 ozs. 3 pwts. 12 grs. of pure silver, or $287,53 (coin).

Galena is one of the most economical silver ores, especially when the proportions of precious

metals are so large as in this case, as the whole of the silver may be readily obtained by smelting; or by smelting this ore which contains a large percentage of lead, with the pyritous gold ores of Colorado, all the precious metals may be obtained from both, at a comparatively small cost.

Respectfully,

A. A. HAYES, M. D.

State Assayer.

It will then be seen that the average yield of the four lodes referred to, exceeds 129 ounces to the ton. It will be well to state that these specimens were not of decomposed quartz, specimens of which have yielded from $500 to $10,000 per ton, but of galena, which laid en masse, and that these specimens indicate the fair value of the whole.

By reference to an account of the Pattinson process of concentrating silver in lead to be found upon a succeeding page, it will be seen that this method has been so perfected that lead yielding but three ounces to the ton can in England be subjected to the process with profit.

The silver mines of Colorado have been so recently developed, that sufficient time has not

elapsed to get in capital, or to erect furnaces. But the results attained by the working of the first furnace ever built in that country, may be seen by the following extracts from the "Miners' Register," published in Central City, Colorado.

[*Miner's Register of Aug.* 26, 1865.]

"SILVER. — We saw yesterday, the first ingot of silver ever produced in Colorado. It was at the mining office of James E. Lyon & Co. and had been extracted from a ton and one-third of the ores of the Maria Lode, on North Clear Creek, below Black Hawk. The ingot weighed fifteen pounds, the coin value being over three hundred dollars, at the present rates of selling silver.

It was obtained by first smelting and then cupelling. The company have an immense amount of the ore, and as soon as their furnaces are complete, as they will be, at least, at an early day, the production of such, and larger bars will be a matter of daily occurrence. It is a matter of great importance, as it introduces us to the world as a silver producing country. A year will show that our mines are inferior to none."

[*Miner's Register, August* 28, 1865.]

"THE RESULT. — Twenty-two pounds of solid massy silver were taken from Mr. Lyon's furnace yesterday. Mr. Johnson hadn't time to get sufficient bone dust to cupel the entire charge, else the nugget would have been more than as heavy again. Were not Mr. Johnson the most skilful of workmen, he could not have obtained anything at all satisfactory with the very imperfect implements he has been compelled to use. The parties are satisfied with their success so far."

[*Miner's Register, Sept.* 6, 1865.]

"Glorious. The last result from Lyon's smelting works. Mr. Johnson called this afternoon with five hundred ounces of pure silver taken by him from four and one half tons of ore, it being a part of that which remained from the first charge smelted, of which mention was made a few days since. Other and grander results have been achieved, but which are not as yet allowed publication. The complete success of this experimental smelting of Colorado ores, some of them most refractory, is now established, and the millenium for which we have so eagerly looked has

dawned upon our mines. May triumph attend all the efforts of Lyon and Johnson."

The results attained by Messrs. Lyon & Johnson's furnace were sufficient to induce the owners to immediately commence the erection of extensive works for smelting; and all who have witnessed their process of smelting and cupelling are perfectly satisfied as to its adaptability to the galena silver ores, which abound in such profusion in Colorado.

This is the most propitious period Colorado has ever presented to engage an interest in her mineral wealth. She presents a region unequalled in its extent and of incalculable value. One that has all the resources and supporting auxiliaries of an Empire, with water in abundance, and vast fields of coal and wood, and inexhaustible veins of gold, silver, copper, antimony, tin, nickel, lead, and iron; all of the essentials wherewith to erect, and build, and pay for. Her agricultural resources alone are sufficient to attract an immense immigration. Her boundaries are to be divided by the most practical and adopted line of railway to Utah and California. Sufficient means are already subscribed to more than pay the expense of building

to Colorado, and the rails are being laid by a thousand active hands, and we shall witness its completion to Colorado in a shorter time than that required to build any railroad over the same distance, in the history of railroads before.

As it is now, the route is amply protected over the plains, and it is expected that by the following year the distance by stage will be reduced one half. Two lines now send daily coaches from Atchison, Kansas, which consume between five and six days, in passage to Denver City; but the great bulk of emigrants go with their own teams, the plains in the summer being supplied with a most nutritious kind of grass for their oxen and horses. The route, being along the Platte River, is of course never deficient in water.

The late improvements in working ores cannot fail to make the large investments of capital which have been made in the mines of Colorado profitable when such investments have been directed by a judicious care, and the mining carried on with an eye to economy, and by those who possess qualifications for business; without which no mining operations can be successful for any length of time.

The following extracts are given, descriptive and concerning the silver regions of Colorado.

Extract from letter of A. A. Hodges of Nevada, Col., October 1, 1865.

"For several years it has been the belief of miners that a belt of silver lodes passed through the country, near the head waters of South Clear Creek, Snake, Blue, Platte and Arkansas Rivers. As far back as the year 1859, nuggets of silver were taken out of the Blue river and some of its tributaries; but not until within a year or two has any attention been paid as to the sources from whence these nuggets came, but late investigations and assays have proven that we have in Colorado, some of the richest silver mines extant. I have not the least doubt but that the day is not far distant when the silver mines of Colorado, and especially those of Ten Mile District and other districts adjoining to it, will equal if not surpass any silver mines heretofore known.

I form this opinion from the result of a personal examination of that part of the country this summer, extending through a period of several weeks.

The character of the ores and of the blossom rocks associated with the lodes, present unmistakable evidences of rich deposits of silver. I have heard of some assays as high as $7,000 per

ton. The general course of the lodes is north-east and southwest, and in most instances crosses the hills in a direction well calculated for tunnelling. The width of the belt seems to be between 10 and 20 miles, and is known as the Silver Belt of the Blue.

From some of the gulches in Ten Mile District a considerable quantity of pure silver nuggets have been taken averaging from an ounce to a pound in weight. These were picked up near the surface, and further developments must undoubtedly exhibit others of greater weight. The width of some of the crevices is enormous, in many instances ten and twenty feet, and even as high as forty feet. Ores are found upon the surface in abundance, requiring no delay, and but very little expense to supply abundant material for mills.

The lodes crossing the mountains assume the pitch of the stratified rock on the surface and become more vertical as they pass down into the eruptive granite, and in crossing the valleys become perpendicular.

I noticed in the instance of one lode, the "Merrimac," that there was a square break-off, or perpendicular ledge, of 200 feet, on the face of which was plainly to be seen, extending from

the top to the bottom, the Merrimac Lode, or vein; that for about the first 150 feet from the top, that the vein was narrow, say from four to eight inches wide, but that it then commenced to widen out, and, in the next 50 feet, attained a width of twelve feet. I mention this to show the probable nature of the veins, the probability being that they will be found more prominent and richer the deeper they are sunk upon.

Ten mile District is situated in Summit County southwest of the Blue River, coursed by a stream known as Ten Mile Creek, emptying into the Blue, about ten miles below Breckenridge, the county seat of Summit County.

The District is a large one, extending from the mouth of Ten Mile Creek, in a southwest course, and includes the many streams, which are the head-waters of the Arkansas and Platte Rivers, in fact being a tract between the head waters of streams, which flow to the Pacific Ocean upon one side, and to the Atlantic upon the other.

Beautiful transparent lakes are scattered throughout various parts of the District.

The climate is milder, and storms less frequent than upon the eastern slope, and is considered by those who have lived there in the past, more

healthful than any portion of the mountains east. Wood is abundant and of great growth. Rich bottom lands line the river sides and the valleys, and natural parks abound in everything necessary for ranching purposes, which feature is a most important one in a mining country.

Clinton, Gilpin and McNulty gulches, where the most valuable lodes are situated, are about fifteen miles in a direct line from Breckenridge, the county seat. The valleys are very level, and, with one exception, there are good natural roads the whole way to the mining District.

I found Ten Mile District to contain veins of minerals in a greater extent and richer character than any I have ever before met with. Everything necessary for the carrying on of mining, and developing the mineral resources of the country, all seem to be embodied in 'Ten Mile.'"

Extract from letter of Judge Cowles, of Empire City, Oct. 9, 1865.

"As regards the Snake River Silver Mines, I think I have an acquaintance with them equal, perhaps, to that of any other person, having been one of the original discoverers of silver in that region, and having assisted in the first

organization of the two mining districts there. I was there one year ago to-day, or rather on Ten Mile Creek, which particular district exhibits the perfection of silver lodes, in the rich outcroppings of galena.

You ask my opinion of the final results of mining in that country. My opinion is but that of a miner, and is, that I most positively believe that it is the richest silver mining district in the United States, if not in the world, and time will prove the truth of my assertion. My experience in silver mines has not been limited to Colorado; for I have been on the frontier for the last twenty years, and have visited the most profitable mining regions in the territories beyond."

Extract from a letter of George C. Reeves, of Colorado, dated Oct. 1, 1865.

"I have just returned from the Snake River mines, where I have resided the past three months, occupying my time in prospecting, assaying and examining ores and lodes. I deem a few notes from the rich silver mines of the Snake and vicinity might prove interesting.

I have made assays of a great many specimens of ore, from a number of different lodes, with

results varying from $50 to $7,700 per ton of 2,000 lbs. The ores are chiefly argentiferous galena, sometimes associated with pyrites of iron, or with antimony, in a gangue of heavy spar or quartz; some of the veins yield true silver ores. I have some fine specimens of ruby silver, and also of grey silver ores.

The lodes I have visited are from one and a half feet, to five feet wide. I have heard of some being discovered much wider, and do not doubt their existence. The veins generally are strong and well marked.

On some of them the outcroppings can be traced several thousand feet. Several ledges of magnetic iron ore have been discovered, also a number of deposits of bog ore.

The mountains upon almost every side are covered with dense forests of pine and spruce, much of it very fine for building purposes. Water power is abundant, good and convenient to the mines.

Coal has been found in several places quite near and there are strong indications of it in some other localities, which might easily be rendered accessible by building roads.

Limestone, sandstone, slate and shale are found within eight or ten miles, and I do not

doubt the existence of fireclay also, though none has positively been found within eighteen miles. So you see everything necessary in the way of materials for an extensive, economical, and convenient mining region, exists there.

I have been in Colorado since the spring of 1860, engaged in mining and milling, have visited nearly all the principal mines in it, but I never have seen a region so rich in promise as that All that is needful is capital and skill, and to these the Snake River mines will, in my opinion, yield most munificent returns."

Extract from a letter of Hon. John T. Lynch, dated at Breckenridge, Summit County, Territory of Colorado, November 3d, 1865.

"Summit County is the extreme northwestern county of Colorado, embracing within its limits nearly twenty-seven thousand square miles; lying between the 39th and 41st degrees of north latitude, and the meridian 105:40 and 109 west of Greenwich.

It occupies a portion of that great section of our country known in the national geography as the Rocky Mountains.

Its surface its diversified by mountains of the

loftiest height and most stupendous grandeur, within whose bosoms are hid stores of mineral wealth, exceeding that of all other nations; and the most beautiful valleys and parks, furnishing unequalled pasturage for millions of cattle and horses, and rewarding the labor of the husbandman with abundant harvests. It abounds in large rivers, fed by innumerable small streams, having their sources in the immense snow-drifts that lie like clouds about the summits of the lofty mountain peaks; and, while traversing the country in every direction, furnish unlimited facilities for mining, manufacturing, and agricultural purposes, and at last mingle their waters with those of the California Gulf.

The soil of the valleys is extremely fertile, and the climate adapted to the production of all the grains, roots, and fruits of the Eastern and Northern States, while the grape, raspberry, strawberry, and whortleberry, grow wild in great abundance.

The streams are full of beautiful trout; the mountains abound in game of all kinds, and the industrious trapper is liberally rewarded with skins and furs of beaver, marten, otter, fox, and bear. Timber is in great abundance and of excellent quality.

The great source of present and future prosperity however in this country is in its great mineral deposits, — unrivalled by any country or State; and, equalled by few in its resources of soil, climate, and magnificent scenery. It stands in its mineral resources as far above all others as its silvery peaks tower above the vast plains that form its eastern boundary.

The mineral resources have been mostly developed in the eastern portion of the county, in the districts watered by the rivers Snake, Swan, Blue, and Ten Mile Creek.

These districts are embraced within a radius of twenty-five miles from Breckenridge, the county seat, and are known to be immensely rich in mines of gold, silver, lead, copper, and iron, with strong indications of cinnabar and platinum.

These mines, situated on the mountain slopes in the midst of abundant timber, and extending down to the banks of never-failing streams, offer facilities for mining and the erection of water-powers and mills, unsurpassed by any mining district on the continent, — the broad park and beautiful valleys furnishing pasturage and hay for vast herds of working cattle and horses.

Snake River and Ten Mile Districts have the most known lodes or mines, and having been

most developed, are more widely and favorably known as rich in gold and silver.

These precious metals are found separately and in combination, in veins of quartz, traversing the mountains in a general direction from northeast to southwest, embracing every kind of quarts known to geologists, and are in width varying from eight inches to twenty feet.

Gold, when not found in combination with silver, is in the quartz, combined with iron and copper, in the form of pyrites or sulphurets.

It is also found in quartz that contains various forms of silver, but not in chemical combination with it. These ores are easily reduced to powder; and by the various methods of extracting the metal now in use, large yields have been obtained.

The silver ores are chiefly of two kinds, argentiferous lead and antimonial silver. These ores from the two districts mentioned are the richest in the known world, ranging from forty to three thousand dollars per ton of surface ore, taken from a depth not exceeding ten feet.

After being pulverized, heat is the principal agent in reducing these ores, and clay of fine quality for fire brick and the construction of furnaces is found in close proximity to the mines.

Coal is also found in other portions of the county.

How useless would be all this wealth of minerals, and these fertile valleys; how wasted this splendid scenery, did the snowy range that separates it from the plains, "the Great Highway of Nations," present an impassable barrier to industry and science!

But such is not the case. From the base of the mountains on the eastern side, through low gaps and passes, the traveller for pleasure or on business — the freighter, with his heavy-laden train of machinery or merchandise, may penetrate the mountain fastnesses, pass from valley to valley beside the rippling streams, revelling in the beauties of nature, and on the mountain's top, at the mouth of the shaft whence issues the nation's wealth, exchange his freight for loads of far greater value, and go forth again to the outer world to help swell the precious stream, flowing forth from these mountains to bless the world in ten thousand ways, and not last nor least, most powerfully contribute to liquidate the thousands of millions of debt now repressing the nation's energies, and place us on a pinnacle of wealth and power hitherto not dreamed of in the history of the race."

Extract from a letter of J. N. French, dated Snake River, November 7, 1865.

"I have passed the summer of 1864 and 1865 prospecting in the Snake River country. I had not been in the country but a few days before I found abundance of its wealth in specimens of rich silver ore. I found, during my residence there, a number of silver lodes of about two feet in width, and one of five feet in width, which contained a vein of solid argentiferous galena of three feet in width. From this lode I have taken specimens which have assayed very rich: one of which yielded at the rate of $1026 per ton of ore. My prospecting this year, was carried on more thoroughly than before, and I have found the country to contain inexhaustible quantities of rich ore; adjacent to streams, which have sufficient fall and water to furnish all the power required in mining. The bottom-lands contain tracts of pines and hemlocks of immense size; with better agricultural facilities than I have ever before seen in any part of Colorado.

Deeming the region of great and vast value, I spent considerable of my time this year in examining the adjacent country, to ascertain the best routes for roads. I passed up the south

branch of Snake River, and crossed the range without finding a very difficult grade; here I reached the head waters of the north branch of the Platte River; this I passed down until I reached another tributary coming in from the north. I followed up this upon an easy grade about ten miles, when crossing a spur of the range I reached the head waters of the Georgetown fork of Clear Creek, finding a course well suited for a wagon road, which could be built with less expense than any I have seen south of Boulder Pass. By going South by way of Gregory Gulch there is a wagon road built within about ten miles of the mines. This will be completed at a trifling expense.

From the mines I took a trip down the river some ten miles, and found large banks which from their outcroppings indicated deposits of stone coal.

I also found large hills of slate; also an immense salt spring of strong saline qualities from which a large amount of salt could be obtained, which may be found of much importance in the future developements of this region so rich in promise. My convictions are, that the silver mines of the Snake present inducements of the strongest possible nature."

Extract from report of A. A. Sawyer, dated at Central City, Colo., Oct. 10, 1865.

Situation of Ten Mile District, Summit Co., Colo. Ten Mile District is situated southwest of Blue River, on a creek of the same name, about (12) twelve miles from the town of Breckenridge, and extends thence across many small streams, to the head-waters of the Arkansas River.

NATURAL ADVANTAGES.

Is easily approached from Breckenridge by natural roads, which pass through valleys having superior richness of soil.

Ten Mile Creek is large, rapid and sufficient in volume to be rendered useful as motive power for mills of the largest capacity hitherto known to be used in gold and silver mining.

Its tributaries, Clinton and Gilpin Gulches are each two and a half miles in length, and each have streams of water, in quantity amply sufficient to move very heavy machinery.

In view of the many expenses attendant upon, and resulting from steam power in its application to mining, I consider the advantages of power

here available, to be of inestimable value to the mining interests of this district.

Overshot wheels will probably be the best adapted to these waters.

The streams have their courses marked by a profuse growth of timber, and the hill sides exhibit trees of immense size.

Only those who have practically experienced the inconveniences and expense arising from its absence in the mining districts of California, Nevada and in this territory too, can fully appreciate the advantages which Ten Mile District possesses in this respect.

Here also are bottom-lands that afford excellent pasturage for cattle, where the raising of hay has already become a valuable enterprise, and where all kinds of grain, as well as vegetables can be raised with but comparatively slight expense.

CHARACTER.

The characteristics of this region are similar to those of the gold mining districts across the range, being hilly and mountainous, with the exception that the natural avenues of approach and exit are more favorable, than are generally

found upon the eastern slope, the valleys being of greater width and evenness, the district having some parks of considerable magnitude, being itself centrally located between the great Middle and South parks of Colorado.

The climate is accounted less severe than that of the gold mining districts upon the eastern slope, the lofty range being a protection from the sweeping winds of the plains.

MINERAL DEPOSITS, &c.

The mineral deposits are principally of silver, gold, copper, lead and iron.

In the basin of Ten Mile, are vast limestone quarries, and in one locality not far from its sources, is an extensive bed of marble, similar in its character to the marble taken from the famous quarries in California. Here therefore will be lime, almost indispensable in the reduction of certain ores, while the marble, will be of great value in a new district like this, where building must go forward with rapidity.

CREVICES.

The crevices of the lodes of this district, in extent, uniformity and prominence, surpass any with which I am familiar. The regularity of the wall rocks is remarkable, cap rock being unknown. In some instances the masses of discolored ore project from the crevices far above the surface of the surrounding debris, varying in width at or near the surface, of from two to ten feet, and marked in their courses across gulches, streams, valleys and mountain slopes, by abundant outcroppings of yellowish, dark red and black colored ore, interspersed with crystallized formations, galena and pyrites of iron and copper.

In one instance (that of the Augustine Lode), I observed a crevice exceeding twenty feet in width, literally choked with a rich looking yellow and black ore, mixed with argentiferous galena and crystals.

ORES.

Among the different kinds here visible, galena-argentiferous is most prominent, and in most of the mines thus far developed is the predominating

element in the combined mass. The average assay of this ore has proven it to be very rich in silver, and some exceptional assays show a greater proportion of the precious metal than any one I have ever before known of.

The value, quantity and accessibility, comparatively speaking, of the silver element, have claimed for it primary attention, and the erection of properly constructed smelting furnaces cannot fail, in my opinion, to obtain results far beyond any yet obtained in this territory, so unprecedentedly rich in its mineral deposits.

Argentiferous galena is to the silver miner what gulch and placer diggings are to the gold miner; in the former case the galena from its fluxing property, furnishes an easy method for the concentration of the silver, while in the latter case, the thoroughly decomposed condition of the auriferous pyritous iron yields an equally sure method of abstraction. Some of the specimens of detached quartz upon being submitted to a strong heat, emit upon the surface many minute globules of pure silver, plainly visible to the naked eye. Many specimens of silver have been extracted from the ores of this region by the use of the blow pipe.

I consider the region rich beyond any expectations I had before visiting it."

[*From the Rocky Mountain News, Denver, Nov. 2, 1865.*]

THE SNAKE RIVER SILVER MINES.

"We received a call this morning from Capt. M. D. Short, from the Snake River Mines, where he has been operating for over a year, and during that time has made four hundred assays of the ores of that region.

During this season he has been experimenting principally to ascertain the best and cheapest way of working the ores, the style and character of furnaces required, etc. Capt. Short's assays demonstrate the fact that the ores tested are marvellously rich in silver; his returns ranging from forty-five to six thousand ounces of metallic silver to the ton of crude ore."

[*From Fuller's Treatise on Silver Mines.*]

"Wherever, in any part of the world, silver mines have been worked, they are worked now, unless arrested for some explainable cause.

The lack of machinery, the existence of war and the incursions of Indians, have, in Mexico,

familiarized our minds with the idea of abandoned mines. But they have all been abandoned for some other cause than that they are exhausted. We know of no silver mining regions in the world which have given out.

The mines of Mexico, originally worked by the native Aztecs, before the Spanish conquest, are worked still. The mines of the Andes have given forth their wealth for more than three centuries. The mines of old Spain have been worked from the middle ages, and are in working condition now.

In Hungary, the same mines worked by the Romans, before the birth of Christ, still yield their steady increase. The silver mines of Frieburg, in Saxony, worked from the eleventh century, have no diminution. In Bohemia, Tyrol, Norway and Sweden, in the Ural and Atlas Mountains, and, indeed, wherever the discoveries of silver have been made, we believe, without exception, the mines continue to be worked to the present day, and are generally more productive now than at any time during their past history. Silver mining, for permanence and rich returns, has had its parallel in no other business."

COLORADO.

Is between latitudes 37° and 41° north, and longitudes 102° and 109° west from Greenwich. Is bounded upon the north by Nebraska and the new territory of Wyoming; upon the south by New Mexico; upon the east by Nebraska and Kansas; and upon the west by Utah.

Its average extent east and west is 380 miles, and north and south 280 miles; containing an area of 106,475 square miles.

The territory is intersected north and south by the Rocky Mountains or Sierra Madre range, the eastern slope and foot plains of which are drained by the head streams of the Platte, Kansas and Arkansas Rivers. The Rio Grande has its sources within this territory, as well as the Rio Colorado, which flows to the Gulf of California.

The eastern half of the territory is one vast plain, which is free from timber, but possessing a soil rich with fertility in many places, and divided by many streams. The plains are covered with a rich nourishing grass, and in previous years have been the tramping grounds of im-

mense herds of buffalo, and which now supply with food the many thousand cattle employed in freighting. Millions of cattle might here roam in the season of grass, and find ample nourishment.

The Western half of this territory is high table land, cut up by traverse ranges and corresponding valleys.

Timber is abundant upon the slopes of the mountains.

Immense beds of coal have been discovered at the foot of the mountains. The most attractive resources however are those of gold and silver, mines of which are found in great abundance.

The gold mines are upon the eastern slopes, and those of silver principally upon the western. Gypsum beds also exist, and mineral springs, alkaline, sulphurous, chalybeate, and most of them so highly charged with carbonic acid, as to be designated as boiling springs.

Gold was first discovered in this territory in the year 1858, at a point near the present city of Denver. The veins of pyritous ore were not discovered until the following year, since which period, the region containing the belt of gold veins has witnessed a constant series of improvements, and settlements.

The capital, Denver, contains a population of from 7,000 to 8,000. That of Central City, the principal mining town, from 5,000 to 6,000. Within a circle of ten or twelve miles from this town are the towns of Black Hawk, Nevada, Idaho, Spanish Bar, Empire City, North Empire, Georgetown and others, which are each the centre of a local mining population.

Smelting works, for the reduction of iron ore, have been erected, and foundries are turning out the shaftings for machinery, &c.

A Railroad Company, the Colorado and Clear Creek, has been incorporated, and a survey completed of the route, from the coal mines to the heart of the mining districts, of about twenty miles in length. This, upon completion, will supply the mills with abundant coal. Meanwhile, the railroad from Omaha, upon the Missouri River, is stretching out rapidly over the plains to Colorado. It is running out now forty miles from the river, and it is expected to connect with Denver City within three years. The whole amount of money necessary to complete it is provided for; and being built under governmental direction, no delay will be allowed. The subsidy from government is $16,000 per mile, besides immense tracts of public land, from

which an immense revenue has been already obtained by the road. Over one thousand men are now engaged in laying the rails over the most level natural road in the world. The most direct route to Colorado, is by way of Chicago and Hannibal and St. Joseph Railroad to Atchison, Kansas, from which point stages leave daily, for Denver City. The time required to reach Atchison, from Boston or New York, is three days, and the passage by stage from Atchison to Denver City, distance 640 miles, five days, though the passage sometimes requires from six to seven days, and has been made in three days and twelve hours, which is the quickest time yet recorded.

The following extracts are given from the letters and addresses from various sources, illustrative of Colorado scenery, mining interests, &c.

BISHOP SIMPSON.

The well known Bishop Simpson of the Methodist Episcopal Church travelled through Colorado in the year 1862.

The following extract from one of his letters is taken from the Christian Advocate of Feb. 28, 1863.

"Even in the mountains very fine vegetables have been produced at an elevation of 9000 feet above the level of the sea.

The pasturage of the plains and mountains is remarkable. The grasses are very nutritious, and they cure standing: Cattle refuse to eat hay in the winter when they can have access to the dry grass of the plains.

Beef cattle that have not been fed a pound of grain or hay are very frequently brought to market, even in winter. The climate is mild and healthful. For nine months in the year, from October to July, little or no rain falls, and even in summer there are few heavy rains, and none of long duration.

The streams are fed by the snows on the mountains. In summer the heat on the plains is at times intense during the day, yet the nights are invariably cool. In the mountains the temperature is lower, and less liable to extremes.

Flourishing villages may be found at an elevation of nine and even eleven thousand feet above the level of the ocean.

In the mountains during the months of July, August, and a portion of September, light showers fall nearly every day,—generally in the

afternoon, caused probably by the evaporation from the mountains, of snow.

Frequently these showers do not reach the plains. On the plains, buffalo, antelope and hare are abundant. In the mountains are found grizzly and cinnamon bears, mountain sheep, bison, elk, and other game. Silver, copper, cinnabar, galena, plumbago, antimony, coal, and salt abound, but none of these mines have been extensively worked, in consequence of the want of capital, and the general tendency to gold mining. Precious stones have also been found, such as opal, agate, amethyst, emerald, etc. Some beautiful moss agates have been picked up in the middle park. The streams abound in trout of delicious flavor.

* * * * * *

Until very recently all the capital used in developing these mines was first obtained from them.

The people who emigrated there were generally poor. To carry on lode mining requires capital. Supplies of all kinds are high. Although there are, perhaps, no richer mines in America, than those of Colorado, no man of limited means should attempt their development. A man or

company with fifty thousand dollars would be almost certain of realizing immense profits."

BISHOP KINGSLEY

In a letter to the Western Christian *Advocate*, says of the scenery of Colorado:

"The scenery in this country is the grandest that can be conceived of. From Denver the view is particularly beautiful. On the south-east, at the distance of seventy miles, and at the northwest, at perhaps the same distance, stand two noted mountains; the former is Pike's Peak, and the latter Long's Peak.

These mountains lift their snowy heads into the heavens about three miles high, and a circular range of snow-covered mountains reaches from one of these vast spurs to the other, the whole forming a tremendous amphitheatre, whose diameter is one hundred and fifty miles. The sight in the morning, as the light of the rising sun falls on their lofty ranges, is most charming.

The sunset views, and also the sights by moonlight, are exceedingly beautiful.

There never was a finer field for the display of the painter's talent. There is a remarkable fact, to which I do not recollect to have seen

attention called, namely, that vegetable and animal life have become acclimated to their mountain temperatures, so that both flourish with a degree of temperature which would prove almost fatal in other parts of the country.

I saw strawberries in bloom at an altitude of two miles. Raspberries flourish in great abundance at this same altitude. It often happens as I was assured again and again in the mountains, that ripe raspberries and strawberries can be taken with one hand and snow with the other.

Many of the most delicate and beautiful flowers come right up through the snow."

Extract from the speech of Hon. H. P. Bennett of Colorado, delivered in the House of Representatives, Washington, Feb. 28, 1863.

"I speak from the united testimony of many practical miners, who have spent several years in the mines of California, when I say that the gold-bearing region of Colorado is far more extensive, quite as inexhaustible, and the gold-bearing quartz of a much richer quality, than California. I make this comparison to give by it to the world a better idea of the extent and richness of these mines, and not with any desire

to depreciate in the least regard the fabulous wealth which still remains "from everlasting to everlasting" in the mines of California.

All things considered, can there be a safer investment than in the stocks of the bullion banks of Colorado? The vaults of these banks are filled with an inexhaustible treasure, placed on deposit there by the Almighty hand, and made subject to the drafts of man. These banks are always specie paying, and their vaults are numerous, long, wide and deep. There is no risk in this business.

The capitalist is but following in a beaten path. The experiment has been made by those who have gone before, and their success is inviting him to follow quickly. Ten, twenty, fifty, a hundred, five hundred thousand dollars, may find ready and very profitable investment, without any possibility of failure, if he will but exercise the most ordinary precaution. Only consider it for a moment, the man of means, with a quartz mill of twelve stamps, and suitable saving apparatus, will crush quartz rock that yields from three to seven hundred dollars to the cord, out of which he can realize from one to five thousand dollars per week. Investments of capital in these gold fields, instead of paying

from five to ten per cent, will double and triple every year."

GOV. EVANS.

The following extract is from Governor Evans' Message to the Legislative Assembly of Colorado Territory, in 1864:

"Before closing, however, allow me to congratulate you upon the rapidly accumulating evidences of the natural resources of Colorado Territory. To the extent and richness of her mines, to the exceedingly nutritious pasturage of her plains, and the fertility of her valleys, I may be allowed to make a passing reference.

It is estimated by those best informed on the subject, that the gold product of the present will be at least double that of any former year, and that the gold mining country has as yet been but partially prospected.

New and rich discoveries are constantly being made; the art of mining is daily being improved and adapted to the peculiarities of our mines, while an annual increase of the home supply of the necessaries of life is tending to diminish the expense of living. * * * The ore is principally composed of the sulphuret of iron (iron pyrites).

That which yields twelve dollars per ton pays expenses. That in most of the lodes, now worked, pays on an average three times that amount, while in some instances it yields one hundred and fifty, two hundred, and even as high as five hundred dollars per ton, treated by the stamping process.

This ore yields, upon analysis, from three to six times as much gold as can be saved by the crushers, giving in some instances, even what appears to be fabulous results.*

A rule in working the mines, that seems to be very uniform, and commands general confidence among miners, is, that, the deeper the mine is penetrated, the richer the ore becomes."

PROF. EDWARD N. KENT.

Extract from a letter of Prof. E. N. Kent, Feb. 7, 1863, for many years at the head of the U. S. Assay Office, New York.

"During my stay in Colorado I made several assays of mill products, the results of which appeared to be almost incredible.

* Dr. D. W. King, of Empire City, has made many analyses of ore, using one ounce of pulverized pyrites each time, with results varying from three hundred and twenty, to two thousand two hundred and forty dollars per ton. Many other analyses have been made with equally as favorable results by other parties.

I have therefore repeated the assays since my return, upon twenty-five different samples which I brought home with me.

These assays have corroborated those made before, under rather unfavorable circumstances incident to a new country.

As to the extent of the gold mines of Colorado I am not prepared to give an estimate, as I found enough to fully employ my time within a radius of five miles of Central City; but as to the richness of them, I have no hesitation in saying that I believe them to be the richest ever discovered.

With science, capital and a Pacific railroad, Colorado is destined, in my opinion, to rival or supersede California and Australia, and become the El Dorado of the west."

GOV. GILPIN.

Extract from letter from Gov. Gilpin, Aug. 8, 1863.

"Gold exists in Colorado in inexhaustible quantity. This area of gold-yielding mountains is the 'Sierra Madre' or primeval Cordilleras, being the purest form of auriferous rocks, on the grandest scale of massiveness.

Undoubtedly Colorado is unequalled in capa-

bility of realizing mineral wealth. Here will rapidly appear a populous State, distinguished by industrial energy and great prosperity."

U. S. COMMISSIONER.

Report of the Commissioner of the U. S. General Land Office upon the mines of Colorado.

"Quartz that yields twelve dollars per ton will pay in favorable localities, but there are veins now worked that will yield from twenty to five hundred dollars per ton. Mines that barely paid at the surface are yielding enormous profits at a depth of a hundred and fifty and two hundred feet.

The value of the mines is absolutely incalculable to the Government. They may be made to yield just in proportion to the number of men employed in working them."

[*From the Mining Journal of Black Hawk, Colorado, Oct. 23, 1865.*]

"An English gentleman, Prof. George J. Pritchett, a man than whom none stands higher before the British public for integrity of purpose, and for both theoretical and practical knowledge of mines and mining, is employed by

the Mining Board of London as a commissioner to visit and report upon the situation and resources of our country.

He is delighted with it. The accessibility, the convenience of fuel and water power, the richness and extent of the mineral veins, the proximity of arable lands, the ease with which railroad communication may be established, — all these have struck him very favorably as compared with other mining countries he is familiar with. He has been similarly employed for many years in Australia and South America; has reported on twenty-one mining properties in Australia, all of which are doing well, and thinks Colorado the finest and best mining country he was ever in.

Those familiar with his views and influence believe the result will be an investment of $20,000,000 of British capital in Colorado mines, to say nothing of the influence that will have, in connection with the British railroad interests in America, in hastening railroad communication with the States."

PATTINSON'S PROCESS OF CONCENTRATING SILVER IN LEAD.

[From the treatise on the metallurgy of silver and lead, by Dr. Robert H. Lamborn, London, 1861.]

This process for which the world is indebted to Mr. Hugh Lee Pattinson, of Newcastle-upon-Tyne, is the most valuable improvement in the metallurgy of lead and silver that has been introduced within the present century. It was invented in 1829, and in a very few years infused a new life into the lead and silver interest of the country. The process even in 1836 was brought to such perfection that it was found by its use the cost of separating silver and lead was decreased to one-third the sum required to treat the argentiferous lead by the old method, and that lead containing but $\frac{5}{1000}$, or about three ounces to the ton, could be subjected to it with profit, while experiment showed that much commercial lead held at that period, five times this amount of silver.

The principle taken advantage of by Pattinson may be exemplified as follows: When a large quantity — not less than two or three tons — of rich lead is fused in a kettle and allowed to cool

gradually and equally, a vast number of small crystals form in the mass. These crystals will consist of pure lead, while the fluid which surrounds them will contain the silver.

If now these crystals be lifted from the kettle by means of a ladle, furnished like a steamer with numerous holes, the argentiferous fluid will fall through, and the poor lead may be placed in a neighboring vessel.

The separation, however, cannot be performed at a single fusion. The crystals, although themselves probably free from silver in chemical combination, detain mechanically, some of the argentiferous fluid, so that the separation is only partial, and two portions of lead will be obtained, one of which has more and the other less silver than the original rich lead.

If the poorer thin portions be again fused and allowed to cool, a second straining may take place, and a rich and poor lead obtained, the latter of which, if treated in the same manner several times, will give in the end a portion of commercial lead almost entirely free from silver. The rich portion remaining in the kettles produces, after repeated fusings and strainings, a lead highly charged with silver, which may be sent to the cupelling furnace. The process is

attended with the oxidation of many impurities, which are skimmed from the surface of the kettles, and thus the quality of the lead produced is unusually excellent. A middling article, containing too little silver to pay for cupelling, may, by this means be made to yield on one hand an excellent lead for the market, and on the other, a quantity of rich lead that may be very profitably cupelled for its silver.

There are some differences in the plans adopted in the concentrations of lead in various establishments, which are the results of the difference in the amount and nature of the rich lead to be treated.

The importance of these differences is in the quantity of crystals dipped out of the kettle at once.

In cases where the lead is poor, what is known as the low system is sometimes adopted, by which as much as seven eighths of the contents of the kettle is dipped out at each fusion, as crystallized lead, and but one eighth is allowed to remain. This system requires but few kettles, and the poor lead is quickly ready for market, but it can only with profit be applied to the varieties of lead holding little silver.

The plan in most general use is known as the

high system, in which as little as two thirds of the lead is strained out as crystallized lead, and the remaining one third allowed to stay in the kettle. This system is best adapted for establishments producing much metal, and should be applied to all leads holding more than 9 or 10 ounces of silver to the ton.

ASSAY FOR SILVER.

ESTIMATION OF THE SILVER CONTAINED IN LEAD ORES.

From the large quantities of silver contained in some varieties of galena, and other lead ores, it is necessary, in order to judge of their commercial value, to ascertain the precise amount of this metal afforded by them.

Cupellation. — This process is founded on the fact, that when an alloy of lead and silver is exposed in a state of fusion to the action of a current of air, the latter metal neither gives off perceptible vapors nor becomes sensibly oxidized, whilst the lead rapidly absorbs oxygen, with the formation of a readily fusible oxide.

In order, then, to extract the silver contained in metallic buttons obtained from the assay of lead ores, it is merely necessary to expose them on a porous medium to such a temperature as will oxidize the lead, whilst the silver is not so affected. The litharge thus produced is absorbed by the porous body on which the assay is supported, and nothing but a small button of pure silver ultimately remains on the test. These supports are called *cupels*, and are made of bone-

ash, slightly moistened with a little water, and consolidated by pressure into an iron mould. The furnace employed for this purpose resembles those used for the assay of lead and copper ores, but is provided with a *Muffle*, or small D-shaped retort, in which the cupels are heated to the required temperature. This muffle is composed of fire-clay, closed at one end, and furnished with small openings in the sides and end, in order to allow of a free circulation of air through it. When fixed, it is so arranged that whilst one of its extremities is supported by a proper shelf, the other corresponds with an opening in the furnace, to the sides of which it is luted by a little fire-clay. The muffle thus placed can be equally heated in every part by a supply of ignited fuel, whilst the openings in its ends and sides admit of the establishment of a current of air from the open end through the interior of the muffle, to the furnace itself. To light this apparatus a little burning coke or charcoal is introduced into the furnace, which is subsequently filled with fuel. The damper is now opened and as soon as the muffle has become red hot, six or eight cupels, which have been drying in the mouth of the opening, are introduced by means of proper tongs, and the button covered with a

little bone-ash in order to prevent its being attacked, in case of any portion of lead being spilt during the progress of the subsequent operations. The open end of the muffle is now closed by means of a fire tile, or a door arranged for that purpose, so as to prevent the introduction of cold air, and the cupels are thus raised to the temperature of the muffle itself. When this takes place the door is removed, and into each of the cupels is introduced, by a pair of slender tongs, a button of the lead to be assayed. The aperture is now again closed during a few minutes, to facilitate the fusion of the alloy, and on its removal each of the cupels will be found to contain a bright metallic globule, in which state the assay is said to be uncovered. Under these circumstances, the lead is quickly converted into litharge, which is absorbed by the bone-ash of the cupel as rapidly as it is produced, whilst at the same time there arises a white vapor that fills the muffle, and is gradually carried off by the door and through the openings in the sides and end. A circular stain is at the same time formed around the globule of metal, which gradually extends and penetrates into the substance of the cupel. When nearly the whole of the lead has thus been removed, the remaining bead

of rich alloy appears to become agitated by a rapid circular motion, which seems to make it revolve with great rapidity. At this stage the motion will be observed suddenly to cease, and the button, after having for an instant emitted a bright flash of light, becomes perfectly immovable. This is called the *brightening* of the assay, and a button of silver now remains on the cupel.

If the cupel were abruptly removed from the muffle, the metallic globule would be liable to *sprout* or *vegetate*, by which a portion of the metal might be thrown off, and a certain amount of loss be thereby entailed. To prevent this taking place, and to guard against any loss of metal, the cupel in which the assay has brightened should be immediately covered by another, kept red-hot for that purpose. The two are now gradually withdrawn together, and, after having sufficiently cooled, the upper cupel is removed, and the globule of silver detached and weighed.

From the fact that silver becomes sensibly volatile at very elevated temperatures, it becomes necessary to make cupellations of this metal at the lowest possible heat at which they can be effected. The temperature best fitted for this operation is obtained when the muffle is at a full

red heat, and the vapors which arise from the assays curl gradually away, and are finally removed by the draught. When the muffle is heated to whiteness, and the vapors rise to the top of the arch, the heat is too great; and when, on the contrary, the fumes lie over the bottom, and the sides of the openings in the muffle begin to darken, a little more fuel must be added or the draught increased.

If an assay has been properly conducted, the button of silver obtained is round, bright, and smooth on its upper surface, and beneath should be crystalline and of a dead-white color; it is easily removed from the cupel, and readily freed from litharge. The globule is now laid hold of by a pair of fine pliers and flattened on a small steel anvil, by which the oxide of lead which often attaches itself to it, becomes pulverized, and may be removed by rubbing with a small hard brush. The flattened disc is then examined by the aid of a lens, in order to be sure that it is perfectly clean, and afterwards weighed in a balance capable of turning with one-thousandth of a grain.

The fuel employed in the furnace consists of hard coke broken into small pieces.

When the ores of lead, in addition to silver,

contain a certain amount of gold, the button remaining on the cupel is an alloy of these metals.

For commercial purposes, the silver contained in any given mineral or alloy is estimated in ounces, pennyweights and grains, one ton of ore or alloy being usually taken as a standard of unity.

SOME ACCOUNT

OF THE

DIFFERENT IMPROVED PROCESSES

NOW BEING

INTRODUCED INTO COLORADO

FOR WORKING GOLD ORES.

LYON'S SMELTING PROCESS.

To work ores by this process, the ore must first be crushed by stamps or some similar process; it then passes to the buddle. This machine consists of a large circular vat, about two feet deep and twenty feet in diameter.

The bottom is smooth, and is elevated in the centre a few inches higher than at the outer edge. Over this bottom or floor four arms revolving about the axis in the centre of the vat, to which tufts of long hair are attached at intervals of about two inches, are made to sweep. These preserve a smooth surface, and by carefully stirring the ores, cause the lighter portions to wash away to the outside. The pulverized ores are fed into a hopper at the centre, and with them a current of water is admitted. The water washes the pulverized ores down from the centre toward

the outside or circumference. The galena, if any is contained in the ores, is left around the centre or axis. The sulphides of copper and iron come next, and the white quartz and sandy portions are carried to the outside. The galena contains most of the silver and some gold, while the copper and iron sulphides contain some silver and nearly all the gold, and the silicious or sandy portion outside contains so little of either, that it is cast aside as worthless. In this way one half the bulk of the crushed ore is removed, and at the same time at least ninety-five per cent of the gold and silver retained. Between the pure sulphides and pure sand is a portion containing both, which is thrown aside to be run through again. By this means the ores are very perfectly separated.

That portion composed of galena, if any such there may be, may then be smelted in Scotch hearths. These consist of a cast iron vessel, similar to a cauldron kettle, with an aperture for discharging the metal. Over this a cupola is erected.

The method of using a Scotch hearth is this: If the ores are a native galena, they are first broken to the size of a walnut, or in case of mixed ores, they are taken from the buddle, and

laid in the hearth with alternate layers of finely split wood from a foot to eighteen inches long.

The wood is then ignited, and a blast of air amounting to about two pounds to the square inch is applied. The lead is readily smelted out, and carries with it the gold and silver contained in the ore. The whole is drawn off in pigs or ingots at the bottom and is ready for cupellation.

The sulphides of iron and copper, after separation by the buddle, are placed in a reverberatory furnace, so constructed as to roast and not smelt the ores. In general the reverberatory furnace is quite similar to a baker's oven, except that it is so constructed that the fire is constantly kept up. For roasting, the roof of the furnace is so shaped that the flame of the fire will pass along over the ores without impinging or striking them; for smelting, on the other hand, the flame is thrown down upon the ores. After roasting, the ores are placed in a smelting reverberatory furnace, mixed with a quantity of protoxide of lead or litharge, varying in amount from one fourth the amount of the ore to very much larger proportions, sometimes many times the weight of the ore.

Other chemicals are used as fluxes as the occasion may require, and should sulphur still

remain at the smelting, a quantity of old iron is thrown in to absorb it. The gold and silver contained in the bars of lead, is then separated by cupellation.

The furnace for this consists of a concave iron hearth, lined to the depth of several inches with bone ashes wet up with water. These bone ashes are prepared by burning bones until they become perfectly white, and then grinding them to flour. Upon this hearth the lead is placed and a fire is lit in the furnace below and around the hearth, and a blast is applied. A portion of the lead is converted into litharge on the surface of the melted metal, and is blown off into a chamber prepared to receive it. Another portion is absorbed by the bone ashes and carries with it, any copper or other base metal which may remain. When all the lead is driven off in this way, the remaining metal suddenly brightens and the work is done. What remains is gold and silver.

The bone ash is afterwards smelted for the lead it contains, and is ready for use again. The loss of lead is about five per cent each time it is used, and will not be greater, provided the furnace is properly arranged.

CROSBY AND THOMPSON'S METHOD OF DESULPHURIZATION.

The ore is first crushed, dry, by stamps, and then fed by a continuous stream into a large revolving cylinder, made of strong sheet iron. This revolves above and between two other revolving cylinders of the same size, all of which are heated by fire beneath.

The upper cylinder being further removed from the fire beneath the two lower cylinders, (the whole number being confined in a brick work,) is not hot enough to dissipate the sulphur contained in the powdered ore, but is sufficient, it is claimed, to throw off the arsenic and antimony, and whatever quicksilver the ore may retain, when it consists of old tailings from stamp and pan mills. The cylinders are not quite horizontal, being depressed at one end sufficient to make the whole time of passage through about thirteen minutes. After passing through the upper cylinder, the ore passes, equally divided, in a hot state, into the two cylinders beneath, which being in contact with the fire are much higher charged with heat than the upper one.

The lower cylinders revolve upon hollow axles,

some five or six inches in diameter, open at both ends. The axles as they pass through the centres of the two lower cylinders, are perforated with many holes through which air is supplied to effect with heat the desulphurization and oxidation. The powdered ore as soon as it is introduced into the lower cylinders, and in a highly heated state comes in contact with the oxygen supplied through the holes in the hollow axles, burns with brilliant scintillations, exhibiting the most varied colors. Before reaching the farther ends of the lower cylinders it has ceased to burn or emit colors, and forms in a vessel beneath, thoroughly desulphurized and oxidized, ready for the amalgamating process. That this process does thoroughly free the ore from sulphur, and destroy the original nature of the iron, no one can doubt who has witnessed its working. The difficulty now to overcome is the one of amalgamation. Still a vast deal more gold can be secured from ore treated by this process in Freiberg or Hepworth Pans, than could previously be obtained in the same pans from raw ore.

A spray chamber, so called, is connected with the cylinders, through which the strong draft from the cylinders passes. This chamber is supplied by a flow of water which percolates through

the upper surface, cooling the heated air and condensing the finer particles of gold, which otherwise would pass out the chimney. Large results are claimed from this addition, and possibly the amount may be equal to five or ten per cent of the whole.

BEHR AND KEITH'S PROCESS.

This process is now, and has been for some time in practical, profitable every-day operation, and it may be safely said of this process, imperfect as it now is, that if no better one is ever discovered, that Colorado ores which will not pay to run in a stamp and pan mill can be worked steadily and profitably, even at the present high rate of labor and materials, by this process. The principle seems to be similar to that of Messrs. Crosby & Thompson's Desulphurizer — that of operating upon powdered ore by the action of heat and oxygen, the method of application however being different. By this process no cylinders are used, the ore being forced by a strong draft through a brick furnace and long flue, by which the ore is roasted and smelted in the air. It is claimed by this process, as well as by that of Messrs. Crosby & Thompson,

that the infinitesimally fine particles of gold are aggregated in small round pellets or globules. This would seem to be conclusive upon an examination of the gold with a strong glass. Many of these small globules appear to have a small concave indentation upon the surface, while others appear to have burst open from the natural shrinkage of the ore from a molten state.

The expense of this process would seem greater than that of Messrs Crosby & Thompson, while the result cannot be more satisfactory, and it certainly has not the merit of equal simplicity; but, from the fact that this process has been and is now successfully at work, it would at the present moment seem to stand ahead of any other.

The present winter, however, will probably decide the question of merit between the different processes.

MASON'S PROCESS.

Mason's process for disintegrating and desulphurizing ores consists in introducing superheated steam into a fire, in such a manner, that in a gaseous form the steam strikes upon the ignited coals or wood, without admixture of atmospheric air, and thus effects the decomposition of water into oxygen and hydrogen gases.

The oxygen unites immediately with the carbon of the burning coals or wood, while the liberated hydrogen passes from the fire and burns in the presence of the oxygen of the air.

The hydrogen flame and the resulting gases being brought into contact with the heated gold and silver ores, the sulphur, arsenic, &c., are dissolved, and are carried off with the products of combustion. The powerful effect of the flame of hydrogen, in dissolving pyritous sulphur, arsenic, antimony, &c., and in attacking oxygen, is well known; but the expense of producing it has hitherto prevented its application to the disintegrating and desulphurization of gold and silver.

Not until this cheap invention and simple method of decomposing water, and thus furnishing hydrogen gas and flame abundantly, has it been at all possible to apply it to this purpose. Furnaces are now operating by this process in California, which receive charges of sixty tons, and are eminently successful. It is claimed, that by this process in Colorado, $100 per ton have been obtained, and from ore which yielded but $4 per ton in a stamp and pan mill. Extensive works are being built to demonstrate this process, under the direction of Mr. Kenyon,

who claims that he will save 95 per cent of the gold and silver contained in the ores, as proven by assay, and that he will sell the process subject to such guarantee.

MINING AS AN INVESTMENT.

The vast extent and known mineral wealth of the United States present facilities for the acquisition of wealth beyond the offerings of any other portion of the globe, and the rapidity with which our mines are being discovered and developed at the present time, is unexampled in past history. That our mines during the past few years have produced yields unprecedently large for the time consumed, cannot be denied. The aggregate yields of the world, during the past fifteen years, with the exceptions of those of Australia and Mexico, do not exhibit any comparison to the amounts derived from the limits of the United States during the same period. We may well pause with reflections upon the probable results of the discovery of the immense mineral deposits of Colorado, where the region of gold infinitely exceeds the richness of California, as surely as the silver veins surpass those of Nevada.

It may be well to review the methods, the

advantages, and the evils resulting from the investment of capital in mining.

From the necessity of having a large amount of capital, to engage in mining to profit, it is found generally necessary to combine the interests of a number of individuals under a system of copartnership, to be managed by one of their number, or by some person who is supposed to be capable.

These companies are generally formed under the laws existing in the section where such companies are organized.

That mining as a whole in this country during the past fifteen years has been profitable is certain. But that such enterprises in many instances have been peculiarly unfortunate is equally evident.

These results have occurred, most generally, from the ignorance, folly, or deliberate misrepresentations of the getters-up of such enterprises.

Judgment and caution are as necessary in the selection of mines as the necessity of integrity, skill and economy, in their management.

If these qualities are not brought in requisition, what can be expected else than disaster, unless by some unexpected accident, fortune guides the reckless venture? Property having

no value is represented by high sounding and deceitful praise, and is bought from these misrepresentations often at prices which would be extravagant for good property; is subscribed for at an extravagant premium, and becomes the means of squandering the capital appropriated for its working.

To prevent this, property should be bought only upon sufficient guaranties from really responsible persons, who can be made directly liable for misstatements and misrepresentations; or, in case the owner of such property is not personally responsible, the funds in payment should be retained until sufficient evidence of a reliable nature can be obtained to fully determine the question of value.

Too much care cannot be taken in buying mining property, even in the richest districts of Colorado. A clear record or abstract from a Recorder's office, does not establish the identity of property, — is no sure evidence of proprietorship; for, although the pre-emption and record may be correct, still the particular lode may have been pre-empted originally under a different name, claims upon which from priority of pre-emption would hold without regard to claims of interlopers and jumpers. To insure against this,

as well as misrepresentation, buyers should have a sufficient guarantee from responsible sellers.

A mine may be intrinsically good, but unless it be worked so as to anticipate a great variety of contingencies, not only the interests of those engaged but the true merits of the neighborhood may be prejudiced.

Those who invest in such adventures, should not do so to the discredit of their means, or engage to an extent where failure would tend to embarrass the operations of their regular business.

Mining interests may be designated under three distinct heads:

1st, Those which pertain to the purchase of mines, for the purpose of disposing of them again at an advanced price.

2d. Those which are involved in the prospecting and development of mines for the purpose of establishing their character and profitable natures; a system of experimental enterprise, quite essential, before engaging in working upon any extended scale. It has been the misfortune of many companies in Colorado, and probably the comparison may with equal justice be applied to other regions, that they have gone forward and developed at great expense, inferior

mines, from the fact that they had possession of such property, when one half of the means so expended, would have purchased more valuable mines in their vicinity, upon which an expenditure of the other half would have yielded returns in excess of the results obtained by a disbursement of the whole upon their original claims.

3rd. Those interests which are identified with the practical working of mines for profit, which was supposed to be carried on, and founded upon a certain knowledge of the vicinity of sufficient ore to answer all practicable purposes, for a considerable period.

It is not absolutely essential that a mining superintendent should be conversant with the technicalities and principles of metallurgy, but it is essential that he should possess some prominent traits which should render him an apt and efficient manager.

Not only habits of honesty and industry, but a mechanical turn of mind, which can be readily adapted to the many appliances and exigencies peculiar to mining.

A discerning mind which can select from the experiences of others similarly engaged, those methods and improvements most desired, and avoid the entanglements, delays and expenses,

incidental to the adoption of visionary and impracticable plans.

It is essential in the formation of companies, that a sufficient working capital should be secured, in excess of the apparent probable expenses and contingencies, particularly in a country so remote as Colorado, which from its want of railroad communication with the States, is liable to occasion delays in the transportation of machinery and materials, and enhance the price of labor and living.

It is well in investments of this character, to control a sufficient number of mines to avoid the necessity of being confined to one, and it may be well to have selections in different districts, particularly when any doubts may exist of the richness or desirable locality of any one. Such a division of interests may be found of great profit, though not apparent at the outset. Some districts from their lo ality, may present superior facilities for mining, either natural or produced by the combined improvements of others, which may make such localities more desirable, though no richer in mineral deposits.

APPENDIX.

Copies of the Mining Laws of a few of the principal Mining Districts.

The laws of other districts in Gilpin and Clear Creek Counties do not differ materially from these. Copies of laws of other districts can be seen at 19 Lindall Street. The Laws of the different mining districts were confirmed by action of the Territorial Government in 1863.

MINING LAWS

OF

UNION DISTRICT.

CLEAR CREEK COUNTY.

At a meeting of the miners of Union District, held at the office of the President, on Monday, the 25th of February, A.D. 1861, a Committee was appointed to classify and revise the laws of said District.

The following were adopted—date not given.

ARTICLE X.

DEFINING CLAIMS.

SEC. 1. Claims designated as Lode claims, shall include one hundred feet, level measure, in length on the Lode, by twenty-five feet on each side of the Lode.

SEC. 2. Gulch claims shall comprise one hundred feet in length, up and down the middle of the Gulch and to the base of each mountain.

SEC. 3. Bar claims shall be one hundred feet in length on the stream, and extend from the middle of the stream as far back as the mining Bar extends.

SEC. 4. Dry or Patch Diggings claims shall have an area of one hundred feet square, and shall be properly laid out and staked before recording.

SEC. 5. All discovered Lodes shall end at any Gulch or Creek, and when discovered on either side of a Gulch or Creek from the first discovery, it shall be considered a new discovery and receive another name, and parties claiming thereon shall have priority of right.

SEC. 6. Miners shall be permitted to hold one claim by pre-emption on each Lode, Gulch, Bar and Patch in the District as real estate.

SEC. 7. Any person claiming on a Lode by discovery shall be entitled to two hundred feet thereon as a discovery claim, and he shall set a post on his discovery, stating the name and direction of the Lode, time of discovery, and the distance claimed as discovery on each way of the post.

SEC. 8. All timber growing on the territory of a well defined Lode, shall be the property of persons claiming thereon.

SEC. 9. No person or persons shall be allowed to hold any territory or timber on any Lode claim except there is a well defined crevice at the discovery of such a Lode.

SEC. 10. When Lodes cross each other or one Lode runs on the territory of another, either party shall have the right to work his Lode or crevice on the territory of the other, provided that no surface deposits or other incumbrances shall interfere with the rights of the first discoverer.

ARTICLE XI.

SEC. 1. Claims designated as Water claims or Mill privileges, shall comprise a length on each Creek of two hundred

and fifty feet straight measure, and each claim shall be properly staked; they shall be held by the first claimant until the first day of June, 1861, without improvement.

SEC. 2. If a *bonâ fide* improvement of water power be not commenced by the first day of June 1861, and completed within four months thereafter, it shall then be forfeited to the District and be sold to the highest bidder, who shall commence to improve the same and complete his improvement within four months after purchase. All Mill privileges when improved shall be held as real estate, as in the States.

ARTICLE XII.

BUILDING SITES.

SEC. 1. Mill building sites may be two hundred and fifty feet square, or two hundred by three hundred feet, at the option of the pre-emptor, provided they do not interfere with laid out streets: — they shall also be duly recorded.

SEC. 2. Agricultural claims shall not interfere nor take precedence of mining claims or mill building privileges.

ARTICLE XIII.

SEC. 1. Ranche or agricultural claims shall consist of one hundred acres.

ARTICLE XIV.

SEC. 1. *Be it resolved*, That as much of the valley of Middle Clear Creek in Union District as lies between the mouth of Bard Creek and Mad Creek, excepting the Ranche of George Merrill, is hereby declared, commons, for the use and benefit of the citizens of Union District; about two

hundred acres of which is to be surveyed and laid out into a town-site of suitable lots for business, dwelling, mill and mining purposes, and the remainder of the grounds shall be laid out into out-lots, to be donated or sold to the citizens for improvement.

SEC. 2. Said town-site and commons shall be under the executive management and control of a Board of Three Trustees: — the President, Recorder and Surveyor shall constitute said Board.

SEC. 10. Any person pre-empting a town lot, shall commence a *bonâ fide* improvement upon the same, within sixty days from date of record, and complete said improvement within five months from the date of said record; said improvement to be of a *bonâ fide* character and of the value of fifty dollars.

SEC. 11. Any pre-empted lot on which an improvement is not commenced and completed within the time specified in section ten, shall be forfeited to the public.

ARTICLE XV.

TUNNELS.

SEC. 1. Any person or persons intending to drive a Tunnel shall be entitled to two hundred by four hundred feet at the mouth of the tunnel, for surface deposits: — they shall survey and stake off said tunnel claim — give notice of its starting point, direction and terminus, and shall file a full statement of facts with the Recorder.

SEC. 2. The Tunnel party shall be entitled to four hundred feet on all Lodes it may discover while driving the Tunnel or its branches, and to two hundred feet on all Lodes that may be discovered after the location of the Tunnel, below a

surface of two hundred feet: — they shall also have the right of way through all discovered Lodes held by other parties.

Sec. 3. If the work on the Tunnel be not commenced within thirty days from the date of record, the claim shall be forfeited, and if not driven at least five feet each month, it shall also be forfeited.

ARTICLE XVI.

MISCELLANEOUS.

When a Tunnel is driven to a depth of one hundred feet, it shall become real estate.

Sec. 5. There shall be two regular miners' meetings held each year, in the District; one to be held on the first Monday in March and the other on the first Monday in October.

It shall be the duty of the President of the District to post notices ten days previous to the time of such meetings.

ARTICLE XVI.

MISCELLANEOUS.

Sec. 4. Priority of record and of right, shall in all cases be respected, except where especially provided for.

Sec. 8. This Constitution and Laws shall not be altered, amended or repealed, except at a regular miners' meeting, and shall take effect from and after their adoption.

Sec. 9. All District laws heretofore enacted and not in conformity to this Constitution and Code, are hereby declared inoperative, void, and repealed.

SEC. 7. All persons who shall have claims recorded in this District, and shall fail to pay the recording of the same within thirty days of the date of record, shall forfeit them to the Recorder, who shall sell them to the highest bidder, by giving ten days notice of such sale.

The proceeds of such sale shall go to pay the recording of the above mentioned claims. The expenses of the sale and all surplus moneys so received shall be paid into the treasury of the District.

SEC. 13. All property and claims of every kind that are, or shall hereafter be forfeited according to the Laws of this District, shall be forfeited to the public without any process whatever, and not to the District as heretofore provided.

SEC. 15. All water-powers now held by *bonâ fide* residents of this Territory shall be held as Real Estate.

SEC. 16. It shall be the duty of the Recorder to provide a well bound book within two weeks after the passage hereof, and to record therein all the laws, by-laws and resolutions of this District, in the order in which they have been and shall be passed, with the dates of the passage of such Acts or Laws.

I hereby certify that the foregoing is a true and correct copy of the Laws of Union District, as amended and passed at the adjourned regular miners' meeting, held on the 21st day of October, A. D. 1861.

[Signed.]

D. J. BALL,

Recorder and Secretary of Union District.

At the regular Miners' meeting, held October 21st, 1861, the following resolutions were adopted:

1. *Resolved*, That all laws and parts of laws discriminating or making a distinction or difference whatever in the rights, privileges, and immunities of the two sexes, are hereby repealed and abolished.

2. That all laws or parts of laws contrary to this act are hereby abolished and repealed.

SEC. 3. *Resolved*, March 11th, 1861. Every miner shall have the right to open a ditch through the claim or claims below him of sufficient depth to insure a bed-rock drain.

No person shall be permitted to obstruct or remove the water from any Gulch to the detriment of the claim holders above or below him.

Proceedings of Regular Miners' Meeting, Monday, October 7th, 1861.

H. W. HILL, *President*.

The meeting was called to order, and on motion of Lewis Morris, a committee of nine was appointed, to revise and draft laws, and to report at 7 o'clock P. M., for the action of the meeting.

The meeting adjourned until 7 o'clock, P. M.

7 o'clock, P. M. Met, pursuant to adjournment.

Committee reported, and asked for further time to complete their work. L. D. Rowell moved that when this meeting adjourn, it be until Monday, October 21st, 1861, at 10 o'clock A. M. Carried.

On motion of J. H. Adams, the committee were allowed until Monday, October 21st, 1861, at 10 o'clock, A. M., to make their report. Carried.

On motion, the meeting adjourned accordingly.

D. J. BALL, *Secretary*.

MONDAY, Oct. 21, 1861.

Met pursuant to adjournment.

On motion, the Report of the Committee, was received and the Committee discharged.

On motion, the Report was read and acted upon by sections.

All of the sections that were adopted are embodied in the "Laws and Regulations of Union District" — see this book, — (that is, the book from which the foregoing is copied,) from page one to page sixty-one.

On motion, the meeting adjourned until Saturday, Nov. 30th, 1861.

D. J. BALL, *Secretary.*

(No legislation was had relative to claims at any later date.)

[U. S. Int. Revenue Stamp.]

TERRITORY OF COLORADO,
COUNTY OF CLEAR CREEK.

This is to certify that the foregoing is a true transcript of the Laws of Upper Union District, County and Territory aforesaid, as appears in District Records.

Witness my hand, and the seal of office, this second day of September, A. D., 1865.

P. E. CHARRUAUD, *Recorder.*

MINING LAWS

OF

GREGORY DISTRICT.

GILPIN COUNTY.

AN ACT *defining claims and regulating the title thereto.*

SECTION 1. *Be it enacted by the citizens of Gregory District, in Convention assembled,* That all mining leads of gold, or any other precious or useful metals, and all mining and other claims, shall be held under and defined by the provisions of this act.

SECT. 2. *Be it further enacted,* That the term "claim," as used in this District, shall be construed to mean, when applied to a lead, one hundred feet, running the length of the same, and fifty feet in width; when applied to a gulch, one hundred feet, following its meanderings and extending from bank to bank; when applied to patch or placer diggings, one hundred feet square; when applied to tunnelling claims, the entire distance intended to run the same for discovery purposes, as shown by record and the stake at the mouth of the tunnel; when applied to a quartz mill claim, the distance of two hundred and fifty feet square;

when applied to a ditch claim, the entire distance staked out which they intend to run the same, or shown by the survey and stakes; when applied to a water claim, the exclusive right to use water for mining purposes upon any ditch or stream, not exceeding in distance 250 feet; when applied to a farming or ranch claim, one hundred and sixty acres; when applied to a building claim, forty feet front, and one hundred feet deep.

SECT. 3. *Be it further enacted*, That no person shall have more than one lead, gulch, patch or placer claim, in this District, except by purchase or discovery.

SECT. 4. *Be it further enacted*, That no person shall hold more than one water, building, farming, or ranch claim, except by purchase.

SECT. 5. *Be it further enacted*, That each discovery claim shall be marked as such, and all purchased claims shall be recorded, and in either case they shall be safely held whether worked or not.

SECT. 6. *Be it further enacted*, That any claim or claims not held, either by purchase or discovery, if abandoned for ten consecutive days, after being staked off, shall be forfeited to any person or persons who may take up the same and work them and not abandon them as aforesaid.

SECT. 7. *Be it further enacted*, That no claim shall be regarded as good and valid, unless staked off with the owner's name, giving the direction, length, width and date, when the same was made, and when held by a company, the name of each member thereof shall conspicuously appear.

SECT. 8. *Be it further enacted*, That when members of a company, consisting of two or more, shall work one claim of the company, the rest shall be considered as worked by putting a notice of the same thereon.

SECT. 9. *Be it further enacted*, That all mining claims which have been or may be taken up, before the 1st day of June next, need not be worked until that date, provided, however, that the person who so has, or shall take up a claim as aforesaid, shall file with the Recorder for record, a statement thereof wherein he shall describe the claim, and aver that it cannot be worked profitably for the want of either water or the proper machinery, until the first day of June next, at which time he believes the said water or machinery can be procured.

SECT. 10. *Be it further enacted*, That in all cases when parties shall have complied with the law as far as possible, priority of claim, when honestly carried out, shall be respected.

SECT. 11. *Be it further enacted*, That all contracts of partnership or agreements, whereby an interest in claims or lands are concerned, and all contracts relating thereto, hereafter made, shall be in writing, and give the names and interests of each of the parties, and when a partnership the firm name also, and the same shall be recorded before the 1st day of April next, or the said contracts shall not be regarded as binding upon, or affecting any but the original parties in any transaction whatever.

SECT. 12. *Be it further enacted*, That all deeds, bonds, contracts, bills of sale, or instruments of any kind relating to the conveyance of claims and bonds, shall be witnessed by at least two disinterested witnesses and recorded.

SECT. 13. *Be it further enacted*, That when any miner shall hold both a gulch and lead claim, if one be worked the other may be held without working, by recording the same.

SECT. 14. *Be it further enacted*, That any person owning a quartz mine claim, upon which he has a mill or is preparing to place one, may claim the right to cut a race or ditch from

any stream to bring water to said mill, not interfering with vested rights.

SECT. 15. *Be it further enacted*, That all claims held by virtue of laws heretofore in force, shall be regarded as vested property, and no person shall be disturbed in the possession thereof.

SECT. 16. *Be it further enacted*, That when water is claimed for gulch and quartz mining purposes, on the same stream, neither shall have the right to more than one half, unless there shall be insufficient for both, when priority of claim shall determine.

SECT. 17. *Be it further enacted*, That if two or more parties wish to use water on the same stream or ravine for quartz mining purposes, no person shall be entitled to use more than his proportionate share of water, but in case there shall not be water sufficient for all, priority of claim shall determine the right to such water.

SECT. 18. *Be it further enacted*, That when water companies are engaged in bringing water into any portion of the mines, they shall have the right of way secured to them, and may pass over any claim, road or ditch, provided the water shall be so guarded as not to interfere with any vested rights.

SECT. 19. *Be it further enacted*, That if other questions not settled by the provisions of this act, arising out of the rights of riparian proprietors shall be divide according to the common law.

SECT. 20. *Be it further enacted*, That claims of every kind, except discovery mining claims, must be recorded, unless the same are continuously worked or used according to law.

SECT. 21. *Be it further enacted*, That the rules and regulations observed in mining regions, within the United States,

relating to digging for gold under building lots, upon ranch, farming and other claims, shall be observed in this District.

SECT. 22. *Be it further enacted*, That if any person shall locate a tunnel in this District for the purposes of discovery, he shall first file a specification of the same with the Recorder, whose duty it shall be to record the same upon payment of his fees. The said specification shall state the place of commencement and the termination of the said tunnel, together with the names of the parties interested therein. A four square stake shall be placed on its mouth, having written thereon the same things hereby made necessary to record.

SECT. 23. *Be it further enacted*, That any person or persons engaged in working a tunnel provided he or they shall comply with the requirements of the law, shall be entitled to two hundred and fifty feet on each side of all leads discovered in consequence of the same, and such parts of the leads as they are entitled to in consequence of said discovery, shall be held as discovery claims; provided however, they do not interfere with any vested rights, and if it shall appear that leads are staked off on the line of said tunnel, so that the required number of feet cannot be taken near to the same, they may be taken upon any part thereof wherever the same may be found vacant.

SECT. 24. *Be it further enacted*, That if the person or persons locating a tunnel, shall fail to work the same for twenty consecutive days, after the 1st day of July next, they shall forfeit their claim to said tunnel but not to the claims they have discovered and held by virtue of discovery before the time of forfeiture:

SECT. 25. *Be it further enacted*, That the person or persons working a tunnel, shall, after the same is legally located, have

the priority of right to all leads discovered on the line of the tunnel from the recorded line of its mouth to its terminus, and shall have the right of way through all leads which may lie in the course said tunnel is recorded, staked out and worked.

Approved Feb. 18, 1860.

M. STORMS,
Recorder.

J. S. STONE,
Judge of the Miners' Court.

MINING LAWS

OF

RUSSELL DISTRICT,

GILPIN COUNTY.

DEFINING CLAIMS.

SECT. 61. All miners may hold one gulch claim, one quartz or lode claim on each lode discovered, one side and patch claim, by pre-emption, without any restrictions in regard to working the same; and if purchased, there shall be no restrictions, provided said purchase or purchases are in good faith, and a fair compensation is paid for the same; and title thereto shall be as good and as sacred as title to real estate in the States.

SECT. 62. A gulch claim is understood to be one hundred feet up and down the centre of the gulch, and from bank to bank. A lode claim shall be twenty-five feet on either side of the stakes of the claimant, and one hundred feet running on a line of his stakes, provided that the claimant shall have twenty-five days to develop his crevice, and to rectify his stakes from the day of staking. A patch and a side claim shall be one hundred feet square; and in all cases, pre-emptors shall be required to plainly define their boundaries. In staking claims, parties shall state thereon their names,

the date of staking, and if a lode, the name thereof, and number and direction; and in other cases what they claim.

SECT. 63. A mining claim, which is actually such a claim as described on the record, shall hereafter hold all mines within its limits or boundaries. When lodes cross each other, the one first discovered shall have the right to work out the crevice through the cross lode; and the person discovering a cross lode shall only work the same up to the first discovered crevice; but priority of claims shall in all cases be respected.

SECT. 64. Building lots shall not exceed one hundred feet front, by two hundred in depth, and may be pre-empted in more than one parcel to suit the claimant. Mill sites shall be two hundred feet square. Mining claims shall take precedence of all others, provided they are first recorded. No other claims shall interfere with said mining claims without the consent of the parties holding such claims. If building claim is the first on record, the mining shall be done in such a manner as not to injure the building thereon.

SECT. 65. Agricultural claims shall not interfere with mining claims.

DISCOVERY CLAIMS.

SECT. 66. Any person who shall develop a lode, shall be entitled to two hundred feet thereon as a discovery claim, and shall be required to set a post on his claim, designating the name and direction of the lode, and that it is the discovery claim; also, he shall develop the crevice.

SECT. 67. Females shall have the same rights as males. Youths under the age of ten years shall not be allowed to hold claims.

SECT. 68. No timber claims are allowed.

RECORDS.

SECT. 69. The Recorder shall provide suitable books for his office, in which he shall record all claims, deeds, and other papers and documents proper to be recorded, upon payment of his fees; and shall also file and safely keep all documents which are proper to be so filed, upon payment of his fees; but it shall not be his duty to prepare any papers whatever for record. Claims shall be fully described in writing, stating the time of staking, the purpose for which claimed, and the names of all persons claiming interest therein, and the most natural marks or boundaries, together with such other things as shall be necessary to a full description. Each paper presented for record shall be filed therefor with an endorsement, stating the exact time it was received, and shall be recorded in the order received; and after being recorded, the book and page on which it is recorded shall be endorsed thereon. Each deed shall be filed for record within five days after its execution, and shall be attested by at least two disinterested witnesses. Said records shall at all proper times be open to the examination of all persons. The Recorder shall not keep his office open on Sunday, nor receive any papers for record thereon, and no record or filing thereon shall be valid. All claims shall be filed for record within six days from the staking thereof.

TUNNELS.

SECT. 70. Any person or persons driving a tunnel in said District, shall be entitled to four hundred feet in length, and three hundred feet in width, as surface claim at the mouth of said tunnel for tunnel deposits; and to eight

hundred feet on each and every lead from the mouth to the terminus of said tunnel, and at any place on said leads not interfering with previous claimants. It shall be the duty of all persons driving tunnels to post notices, giving their terminus and direction, at the mouths of their tunnels. The location of all tunnels, together with their direction and terminus, shall be recorded. When tunnels are legally located, it shall be considered that the tunnel company shall have a priority of right to locate their claims within a distance of four hundred feet, on each side of the line of their tunnel, on all leads from its mouth to its terminus, or on such portion of the tunnel as may be in this District. If the person or persons locating a tunnel, shall fail to work the same for twenty consecutive days, after the first day of July next, they shall forfeit their claims to said tunnel, but not to the claims they have discovered and held by virtue of discovery, before the time of forfeiture.

MISCELLANEOUS.

SECT. 71. No miner shall obstruct in any way the water running in Russell Ravine or tributaries, between the hours of six o'clock A. M., and six o'clock P. M.

SECT. 72. Every miner shall have the right to open a ditch through the claims below his own for the purpose of draining his claim; and each miner shall be required to cut a ditch through his own claim if he be benefited thereby. No man shall obstruct the water to the injury of his neighbor, above or below, as is the custom of mining countries.

SECT. 73. Witnesses shall be entitled to receive one and a half dollars at the time they are summoned, if they

demand it; and the same sum for each day's attendance after the first.

SECT. 74. Any officer resigning or removing from the District, shall be required to deposit all the books, papers, money, &c., &c., with the remaining officer or officers of the District; which officer or officers shall immediately call an election for filling such vacancy.

SECT. 75. These laws shall take effect from and after their adoption, and shall not be altered or amended without the authority or sanction of two-thirds of the voters at any meeting which may be legally called for that purpose.

I HEREBY CERTIFY the foregoing to be a true copy of the laws adopted at a miners' meeting, held in Russell District, on Saturday, July 28th, 1860; a copy of which is filed in my office.

C. S. FASSETT,

Secretary of Russell District.

MINING LAWS

OF

TRAIL CREEK DISTRICT,

CLEAR CREEK COUNTY.

AUGUST 25TH, 1860.

SECT. 2. *Resolved*, That each and every person shall be allowed to record and hold four hundred feet on Trail Creek and three hundred feet on Chicago Creek, as a mill claim.

SECT. 3. *Resolved*, That the discoverers of any Lode in this District shall be allowed to record and hold two hundred feet on each and every Lode that he may discover in this District, as a discovery claim, and the same shall be held as real estate, and be exempt from execution or attachment.

SECT. 4. *Resolved*, That R. Harden, Wm. Griffith and N. Bristol be a committee to draft laws for this District, and report next Saturday.

SECT. 5. When on motion, Samuel Tusk was duly elected President, William Griffith, Sheriff, and N. Bristol, Recorder, when on motion the meeting adjourned till next Saturday, at 1 o'clock P. M.

R. HARDEN, CHAIRMAN.

T. J. MITCHELL, *Secretary*.

Met pursuant to adjournment, the President in the chair, when the meeting was called to order, and the committee on Laws, by their chairman, N. Bristol, made the following Report, which was read by the chair.

SECT. 6. *Resolved*, That all Lode claims shall be one hundred feet by fifty feet, except discovery claims, which shall be two hundred feet by fifty feet, and all Gulch claims shall be one hundred feet square.

SECT. 8. *Resolved*, That all claims shall be recorded within fifteen days from the time they are staked, otherwise they are forfeited, and all claims recorded shall hold good until the 1st day of July, A. D. 1861, and no law shall affect the title to them before that time.

SECT. 9. *Resolved*, That no lawyer, attorney, counsellor or pettifogger shall be allowed to plead in any cause, or before any jury or judge in this District.

Signed N. BRISTOL,
WILLIAM GRIFFITH.

When, on motion, the Report was adopted.

At a meeting of the Miners of Trail Creek District, held according to previous notice, September 29th, 1860, the meeting was called to order — the President in the chair — when the following resolutions were adopted:

SECT. 2. *Resolved*, That each and every person shall be entitled to hold one claim by pre-emption, upon each and every Lode in this District, in their own name.

SECT. 3. *Resolved*, That from and after this date, all claims in this District, and all claims hereafter taken in this District, shall be deemed and held as real estate, and the same is hereby declared to be real estate upon the holder paying to the Recorder fifty cents yearly, by the Recorder giving to

the holder a receipt for the same after they are recorded, and before which time they shall be subject to the former laws of this District, and it shall be the duty of the Recorder to measure and stake all claims as soon as the location and direction of the Lode is determined : — provided, that if the holders of any claim or claims shall fail to pay said tax for one year, then said claim or claims shall be forfeited.

Sect. 4. *Resolved*, That each and every person recording a Tunnel claim, shall be entitled to hold two hundred feet on each side of the shaft, and two hundred feet from the mouth of the shaft, and no person shall be allowed to hold more than fifty feet deep on any undiscovered Lode at the time of recording the Tunnel claim, and all Tunnel claims filed previous to this date shall be deemed valid, and the right of way through all Lodes previously taken shall be seven feet square.

Sect. 5. *Resolved*, That each and every person holding mill claims, shall be allowed to record and hold the same as Gulch diggins.

At a meeting held at the Recorder's Office, Trail Creek District, February 25th, the Resolutions were adopted.

Resolved, That Lots shall be forty feet front by one hundred deep, and then a passage forty feet on the back end of each lot.

Resolved, That every person recording a Building Lot shall commence a building upon the same within sixty days, and complete the same upon said lot within ninety days from the time of recording, or forfeit said lot.

Resolved, That from the Mill claims, back up the mountain, a street shall be reserved from record, eighty feet wide, forty from each end of every mill claim.

Resolved, That one half of the tax levied on the claims to

make them real estate, shall be held by the Recorder as ex-officio Treasurer, for the benefit of widows and orphans of deceased miners, and the destitute and unfortunate and decrepit and maimed miners of this District, said fund to be paid out upon the recommendation of three persons chosen by the miners of this district, whose duty it shall be to visit the distressed and afflicted of the District, and the fund so created to be drawn upon by the certificate of the president upon the recommendation of said Committee of three. Said tax shall be considered due on the first of July in each year, and if not paid by the first of October, said claim or claims shall be forfeited and subject to pre-emption the same as other claims in the district.

At a meeting held at the Recorder's Office on the 14th day of March, 1861, it was

Resolved, That where one Lode crosses another, that the oldest claim shall be entitled to hold the crevice, and the owner of the cross Lode shall be entitled to work up to the crevice, provided that he shall not place any obstructions in the way of the oldest claimant, and every person shall be entitled to all spurs and blow-outs within the fifty feet allowed by this District.

Resolved, That the tax making them real estate is hereby repealed.

Resolved, That all claims be held as real estate.

Resolved, That the regular meetings shall be the 1st of January, the 1st of July and the 1st of October, in each year, and no law shall be altered or amended, only at a regular meeting.

At a meeting of the citizens of Trail Creek District, held May 29th, 1861, at 1 o'clock P. M., a committee was appointed to codify and amend the laws of said District and

to report the said laws so codified and amended in a meeting to be held June 5th, at 7 o'clock, P. M. The committee made the following Report, which was adopted.

CLAIMS.

Be it enacted, by the citizens of Trail Creek, in convention assembled, that the term "claim," as used in this District, shall be construed to mean, when applied to a Lode, one hundred feet in length and the crevice of the Lode; when applied to a Gulch, one hundred feet in length and from bank to bank; when applied to Tunnelling claims, the entire distance intended to run the same for discovery purposes as shown by record and the stake at the mouth of the Tunnel; when applied to a Mill claim, four hundred feet on the stream and fifty feet on each side of the same; when applied to a Building claim, forty feet in front and running back one hundred feet.

SECT. 2. *Be it further enacted*, That no person shall hold more than one Mill or Building claim, except by purchase.

SECT. 3. *Be it further enacted*, That all Lode claims shall be held as real estate.

SECT. 4. *Be it further enacted*, That each discovery claim shall be two hundred feet in length, shall be marked as such, and before any Lode shall be recorded, the crevice shall be defined by the discoverer of the same, and no pre-emption shall be valid on such Lode until the crevice shall be so defined and recorded, and discoverers of Lodes shall be allowed fifteen days from the time of staking their discovery to record the same.

SECT. 5. *Be it further enacted*, That all Lode claims shall be allowed twenty-five feet on each side for depositing dirt,

quarts, &c., except when the Lodes run parallel within less than fifty feet of each other, or crossing each other, when the ground shall be equally divided between the two Lodes; and where two Lodes cross each other, the oldest shall have the right of way across the other.

SECT. 7. *Be it further enacted*, That all Mill claims shall be improved within one year from the passage of this law or the same shall be forfeited, and no two Mill claims shall be allowed side by side on any Gulch.

SECT. 8. *Be it further enacted*, That all discovery claims or Lodes shall be examined by two competent witnesses chosen by the discoverer for that purpose, who shall file with the Recorder a written certificate that the same is a discovery, within the laws of this district before the same shall be recorded.

SECT. 9. *Be it further enacted*, That no person shall hold more than one claim on any Lode or Gulch, except by discovery or purchase.

SECT. 10. *Be it further enacted*, That no person shall hold a claim by pre-emption in this District, who is not an actual resident of this or some mining District in the Rocky Mountains.

SECT. 11. *Be it further enacted*, That no person shall be allowed to take Timber claims in this District.

SECT. 12. *Be it further enacted*, That no person or persons shall be allowed to claim Town or Village sites within this District.

(Tunnel claims must be worked continually to hold good.)

Be it enacted, By the citizens of Trail Creek in convention assembled, that all laws contravening with the laws now adopted, be, and the same are hereby repealed.

Approved, June 5th, 1861.

TRAIL CREEK, Oct. 28, 1861.

At a meeting of the Miners of Trail Creek, held October 28th, 1861, the following laws were adopted.

That all certificates now lying in the Recorder's Office not called for, are to be sold at public auction in thirty days from date, and all claims not sold at said sale will be subject to pre-emption. The proceeds of said sale, after the Recorder's fees are paid, go to the District.

All volunteers' claims are exempt from sale.

All claims must be recorded within fifteen days from filing, or they are forfeited.

[U. S. Int. Revenue Stamp.]

TERRITORY OF COLORADO, }
COUNTY OF CLEAR CREEK. }

This is to certify that the foregoing is a true transcript of the Laws of Trail Creek District, as appears of Record in the District Records of Trail Creek District County and Territory aforesaid.

Witness my hand and seal of office, this second day of September, A. D. 1862.

[SEAL.] P. E. CHARRUAUD, *Recorder.*